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AUTHOR Stasz, Cathleen
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ABSTRACT

Eight vocational and academic classes taught by four different teachers at three comprehensive high schools were studied to identify classroom practices that facilitate teaching and learning generic skills. The teachers studied had a mix of instructional goals for students, including subject matter knowledge and skills, complex reasoning skills and problem-solving strategies, work-related attitudes, and cooperative or group skills. The following design features proved essential to successful classrooms: situated learning (task or activity being studied/taught), culture of expert practice (participants in the environment and how they handle tasks), motivation, and cooperation. In successful classrooms, teachers supported the various classroom design features by using techniques that give students opportunities to observe, engage in, and invent or discover "expert" learning strategies. Modeling and scaffolding (guided and supported practice) proved to be especially effective techniques. Three aspects of school context were found to be especially conducive to student achievement: access to knowledge, press for achievement, and teaching conditions that empower rather than restrain teachers. New models of teacher training and staff development were determined to be increasingly important as academic and vocational education become further integrated and the distinctions between school-based and work-related learning become further blurred. (MN)

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CLASSROOMS THAT WORK: TEACHING AND LEARNING GENERIC SKILLS

Driven by globalization and new technologies, changes in the U.S. economy will require firms to reorganize in ways that demand workers with new and different skills. Many recent school reforms are motivated by the need to equip students with the skills necessary for success in this new economy.

Reformers believe that schools should teach "generic skills" in addition to skills and knowledge specific to a single academic discipline or occupational field. Basic skills like reading, simple mathematics, and life skills (such as how to fill out forms) are often needed to carry out more complicated tasks requiring higher level skills. Complex reasoning and problem-solving skills, which include both formal and everyday reasoning skills, are especially needed in new "flexible" work arrangements (Berryman & Bailey, 1992). In addition, students need teamwork and communications skills and improved attitudes toward work. Because complex reasoning skills and work-related attitudes are critical for workplace success, researchers at the RAND Corporation studied how these skills were taught and learned in academic and vocational classrooms (Stasz, McArthur, Lewis, & Ramsey, 1990; Stasz, Ramsey, Eden, DaVanzo, Farris, & Lewis, 1993).

We conducted intensive research in eight vocational and academic classrooms, taught by four different teachers in three comprehensive high schools. (The schools were in both urban and suburban communities, with students from a variety of socioeconomic and ethnic groups.) The classes were in interior design, English, electronics, architectural drafting, manufacturing, landscape/horticulture, and chemistry (two classes). This report concentrates on those classrooms that "worked," that is, based on our observations and on student perceptions, those that successfully imparted generic skills and attitudes.

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To facilitate discussion of classroom practices, we developed an instructional model that has four components:

- instructional goals
- classroom design
- teaching techniques, and
- school context.

Although we discuss each separately, in practice these components are linked and should be considered in an integrated fashion.

INSTRUCTIONAL GOALS

Teachers' instructional goals are the cornerstone of instruction, as their planning, instructional activities, and teaching techniques are organized around them. At a minimum, teachers desiring to impart generic skills and work-related attitudes to students must include them as instructional goals, along with domain-specific knowledge and skills.

Teachers in our study had a mix of instructional goals for students, including subject-matter knowledge and skills, complex reasoning skills and problem-solving strategies, work-related attitudes, and cooperative or group skills. Each teacher emphasized different goals.

Complex Reasoning Skills

All of the vocational classes that worked—interior design, manufacturing, electronics, and architecture—provided opportunities for students to learn and practice generic problem-solving skills, including problem analysis, repair, troubleshooting, and generation and evaluation of solutions (e.g., to go from home to work and avoid traffic, consider and evaluate all the ways to make the trip). Use of these skills was built into project work—designing a house or an electrical circuit, and designing and manufacturing a wooden truck—so that students had to exercise the skills while solving problems. Students in the English class had to write a critical essay about three novels. This exercise taught them complex thinking skills because they had to read the novels and generate and evaluate ideas about their meaning.

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Work-Related Attitudes

Teachers in classrooms that worked stressed the importance of students taking responsibility for their own learning. All gave students an opportunity to work on their own and solve their own problems, and often exhorted students to "take responsibility" or "figure it out." They refused to answer questions or give opinions when they knew students were capable of forming their own opinions. The interior design teacher often used workplace examples to instill particular attitudes: for example, that supervisors are not interested in hearing excuses or "hard luck stories" about incomplete work.

Cooperative Skills

In the classes that worked, student cooperation was an instructional goal. The interior design teacher had students work in groups on their project—to design and furnish a six-room Victorian house—and explicitly taught a consensus process that students used to make a design decision (selecting fabric) and to justify a decision (the rationale for a specific choice). In electronics, students were taught to be "contributing partners;" in manufacturing, students in each team were expected to resolve differences on their own. Students in architecture and English worked on individual projects but learned to use each other as resources for help in solving problems.

Skills Specific to a Subject Matter

In English and interior design, teachers were more concerned with teaching a learning process than with specific subject-matter skills. For example, while the interior design teacher gave detailed lectures on fabrics, she never tested students on that kind of knowledge. Similarly, the English teacher did not test students for factual knowledge about the books they read. The teacher who taught architecture, electronics, and manufacturing classes paid more attention to subject-matter skills, but focused instruction on the application of knowledge and skills to solve real problems.

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CLASSROOM DESIGN

Previous research on instructional design (Collins, Brown, & Newman, 1989) helped frame our analysis of classroom design along four dimensions—*situated learning, culture of practice, motivation,* and *cooperation.* (*Situated learning* refers to the task or activity. A *culture of practice* refers to the participants in the environment and how they handle tasks.)

Situated Learning

In situated learning environments, students carry out tasks and solve problems that are realistic or "authentic" in the sense that students come to understand the uses of the knowledge and skills they are learning and the different conditions under which they can apply them. Students learn to transfer knowledge to new domains and to use the learning environment to help them solve problems they encounter. To implement situated learning, teachers designed projects that were complex enough to challenge students to use new, subject-matter skills as well as many generic skills.

Students carried out tasks in problem-solving contexts and were given the freedom to apply their skills, evaluate solutions, and face emergent problems. Moreover, these tasks were sequenced to guide the students through the successful learning of increasingly complex and difficult skills and knowledge.

A Culture of Practice

In a culture of expert practice, participants actively communicate about and engage in the skills involved in solving problems or carrying out tasks. Coupled with the authentic activities pursued in situated learning, a culture of practice helps students acquire the knowledge, skills, and attitudes typical of practitioners who work within that particular domain. The classrooms implicitly or explicitly reflected the adult world of work in the particular domain. The interior design class resembled the practice of interior design professionals. The English class embodied several cultures of practice, including that of the reader, the writer, and the college student. The other vocational classes supported cultures where students with varying degrees of expertise could work on projects and learn from each other or where workers on the "shop floor" (manufacturing class) collectively produced a real product.

Motivation and Cooperation

In the five successful classrooms, teachers emphasized intrinsic (e.g., challenge, interest) rather than extrinsic (e.g., grades, praise) motivational factors. Teachers did not discuss performance criteria in terms of grades. Teachers saw individual interest as the key to mobilizing effort. The English teacher, for example, encouraged students to follow their interests in identifying themes for critical essays. Teachers also used challenge as a motivator. The interior design teacher, for example, exhorted students to go beyond "safe" choices and make "bold" design decisions. The English teacher acknowledged the difficulty of the novels students read (e.g., *Love in the Time of Cholera, One Hundred Years of Solitude*), and used that challenge to appeal to students' eventual sense of accomplishment as they came to understand them.

Because student cooperation was an instructional goal, the classes that worked had many group projects. Most successful groups were self-managing. Cooperation was necessary because skills were distributed across the group, and no one person could complete all the tasks by himself or herself. Cooperation was thus a powerful motivator.

TEACHING TECHNIQUES

To support the classroom design features and roles just described, teachers used techniques that gave students opportunities to observe, engage in, and invent or discover "expert" learning strategies. Teachers employed methods identified in earlier research (Collins et al., 1989) that fall roughly into three groups. The first set of techniques help students acquire an integrated set of skills through the process of observation (modeling), and of guided and supported practice (coaching and scaffolding). Teachers modeled behaviors and mental activities—for example, the general "rules of thumb" that subject-matter experts use to guide their problem-solving.

> *Example of Modeling*: Mr. P models how to generate a topic from one's own experience: "If any of you were moved by *Dances with Wolves* and the trashing of a native culture, then transfer your thoughts and feelings about this to *One Hundred Years of Solitude*: Start with your own personal interests in order to make your paper a consuming interest rather than work."

Thus, through modeling, the teacher reveals his own thinking process in generating an idea.

The following example illustrates scaffolding, where the teacher provides enough support to get students working, then withdraws support (or fades), until the students are on their own.

> *Example of Scaffolding*: A student (in manufacturing) is trying to figure out the radius of the circle that forms the wheel well of the toy model. The radius is not recorded on the drawing. Mr. B asks him if he remembers how to find the center of a circle using a compass. The student does not remember. Mr. B reteaches the method of drawing two secants, using a compass and a ruler, and then finding where the lines cross. The student uses this method on his problem, with Mr. B providing just enough assistance to accomplish the task.

A second group of techniques—articulation and reflection—were used to get students to focus their observations of "expert" problem-solving and gain control of their own problem-solving strategies. Finally, teachers used exploration techniques to encourage learner autonomy in carrying out problem-solving processes. Students in electronics were "turned loose" to identify a project, set their own goals for it, and carry it out. Teachers also encouraged exploration by refusing to answer students' questions when they knew students possessed the skills for finding their own solutions. Since students have different degrees of skill and are not proceeding in unison, teachers had to be ready for flexible interactions. Rather than follow lesson plans, they followed the progress of individual stu-

dents. In this sense, teaching was opportunistic rather than planned.

In sum, teachers in classrooms that worked established a "master-apprentice" relationship with students, acting as the students' coach or guide in the learning process, or as a participant in that process. Teachers did not hold the "master" role authoritatively, but rather conveyed the message, "I am here if you need me." These teachers rarely lectured or used other techniques that implied that teachers were the sole source of knowledge.

SCHOOL CONTEXT

An understanding of context provides clues about why certain outcomes prevail over others. We examined three aspects of school context that are known to contribute to high-quality teaching and learning—access to knowledge, press for achievement, and professional teaching conditions (Oakes, 1989).

Access to knowledge refers to the extent to which schools provide students opportunities to learn. Access is influenced by basic resources, such as time, materials, and staff, and by course assignment practices. All three high schools in our study tracked students, and tracking practices influenced class enrollment. The English class was a required course for college-bound seniors. The vocational classes that worked were elective courses and attracted a mixed group of students who were interested in the subject area, and in some cases, could use the class to fulfill a graduation requirement. College-bound students may actually have less access to these classes simply because they need a certain number and type of credits for college enrollment. Thus, they lose an opportunity to learn the generic skills that are taught in vocational classrooms.

The resources available to teachers varied considerably. The interior design class had extra resources because it was sponsored by the state's Regional Occupation Program. Extra funding enabled the teacher to purchase materials needed for the class projects. The other vocational teacher and the English teacher, who taught in the same school, had fewer resources. The English teacher used his own money to purchase copies of the novels and was not able to take the whole class on a field trip to the local university library. But resources, by themselves, are no guarantee of success; the classroom with the most resources (landscape) was the least successful.

A factor that did affect success was *press for achievement*, the pressures that the school exerts to get students to work hard and achieve. The schools in our sample communicated different expectations and values about achievement to their students. Obviously, any school that tracks students does not hold the same achievement standards for all students. But it appears that individual teacher standards can also make a difference for students. The successful vocational teachers, for example, had high expectations for their students despite the school's generally lower expectations for vocational students.

The teacher who taught both English and landscape had different expectations for each group. With high expectations for his English students, he offered the class interesting and meaningful activities and a high-level culture of practice. In landscape class, however, he had few expectations for student learning and focused on behavior. This attention to behavior led to highly structured activities and boring tasks (e.g., weeding, digging ditches, pruning roses). While the landscape students were of lower academic ability and some had behavior problems, we observed some of the same students functioning more effectively in other classrooms where teacher expectations for learning were high for all students. Expectations for students shape decisions about instructional goals, classroom design, teacher roles, and so on, that influence both access to knowledge and press for achievement.

Teaching conditions can empower or constrain teachers, and define how schools function as workplaces for teachers. Although all the teachers in our study said they had autonomy in the classroom and felt supported by administrators, the vocational teachers faced fewer constraints than academic teachers. Since these schools emphasized college preparation, vocational classes and students were marginal to the administrations' concerns. As long as teachers enrolled enough students and served the needs of students who proved least successful in the academic curriculum, school officials were satisfied.

Academic teachers' classes came under more scrutiny. The vocational teacher also taught algebra, but he asked us not to observe this class because the required content constrained what and how he could teach. In other words, the requirements focused his instructional goals on domain knowledge in algebra, and he had little leeway for including generic skills and work-related attitudes.

STUDENT PERCEPTIONS AND ACCOMPLISHMENTS

The model we have outlined focuses on teaching practices and policies that can support them: It does not address learning outcomes. We did not measure learning through tests of knowledge or skills, in part because standardized tests for measuring generic skills and work-related attitudes are not available. Rather, we used our observations, student surveys, and focus group discussions to assess student perceptions of their own learning.

When teachers designed classrooms that situated learning in a culture of practice, students actively used knowledge and skills in an applied way, often in multiple contexts. They were engaged in projects that required problem-solving and exhibited several generic reasoning skills: problem recognition, problem analysis, generation/evaluation/monitoring of solutions, repair and reflection (cf. Stasz, et al., 1990). Cooperative learning and problem-solving was evident, with students sharing knowledge and skills or trying to help each other overcome difficulties. Students appeared engaged in their work and could work independently.

Student discussions in focus groups corroborated our observations. A common theme in the vocational classes was the students' gradual acceptance of the

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class as a place where students had to work to succeed but could expect the teacher's help in exchange for personal effort. Students who had initially taken the class for an easy grade or to fulfill a requirement became "enculturated," that is, they were sold on the teacher's conception of why the subject matter or classroom experience was important for them. Many college-bound students were uncomfortable at first because they were accustomed to performing for grades according to criteria set by the teacher. They commented that the English class taught them to take responsibility for their own learning, including trusting their own thinking and ideas.

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

For educators who believe that students can benefit from learning generic skills and useful work-related attitudes, our study has implications that can stimulate and inform their efforts. First, we found that classroom design and expectations for students are key to implementing classrooms that work. Once teachers develop instructional goals that include generic and domain-specific skills, the next step is to design classroom instruction around project work. Projects should permit students to apply knowledge and skills to a "real-world," complex problem. Learning can be enhanced by creating a culture of practice in the domain that permits students to engage in activities and discourse around a task, such that students of different skill levels learn from the task and each other. Teachers should guide and facilitate the process.

Classrooms that situated learning were clearly motivating and engaging to students. Students who were uncooperative or bored in one class that did not challenge them with meaningful or interesting activity became engaged and cooperative in a classroom that worked. Teacher expectations affected their instructional and classroom design decisions; teachers with high expectations were more successful. Unfortunately, many schools still sort students in ways that affect which classes they can take, what they can learn, and how they are taught. These practices can undermine school reforms aimed at improving teaching and learning of generic skills and better preparing all students for work and education beyond high school.

The successful teachers in our study were experienced teachers with a deep, personal interest in their chosen domain. The interior design teacher was a practicing designer. The English teacher had taken a one-year sabbatical to study writing at a local university and used that experience in designing his literary criticism class. The other vocational teacher had designed and built furniture and homes. These experiences gave these teachers a frame of reference for establishing a culture of practice.

Current teacher training regimes follow the baccalaureate model, which emphasizes subject-matter preparation with the addition of courses in teaching methods. Vocational teachers are more likely to have relevant experience in the world of work. Generally, teachers have little opportunity to come in contact with expert practitioners in business and industry or in college departments who are engaged in a culture of practice. As we move toward programs that intentionally integrate academic and vocational education and blur the distinctions between school-based learning and work-related learning, new models of teacher training and staff development must be devised.

— Cathleen Stasz

REFERENCES

Berryman, S. and Bailey, T. (1992). *The double helix of education and the economy*. New York: Institute on Education and the Economy, Teachers College, Columbia University.

Collins, A., Brown, J.S. and Newman, D. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L.B. Resnick (ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Oakes, J. (1989). What educational indicators? The case of assessing the school context. *Educational Evaluation and Policy Analysis, 11*, 181-199.

Stasz, C., McArthur, D., Lewis, M. and Ramsey, K. (1990). *Teaching and learning generic skills for the workplace*. Santa Monica: RAND (R-4004-NCRVE/UCB) and Berkeley, CA: National Center for Research in Vocational Education (MDS-066).

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